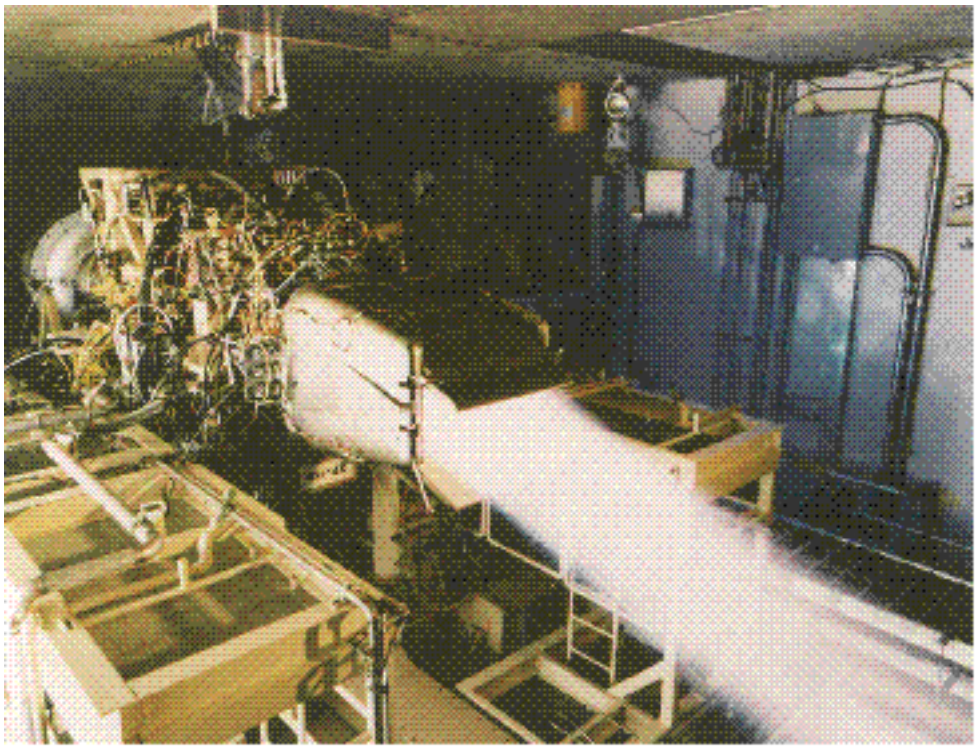
INTEGRATED PRODUCT DEVELOPMENT (IPD) PRINCIPLES USED TO DESIGN JET ENGINE NOZZLES



Payoff

The implementation of IPD principles by industry, will ensure the smooth transition of advanced two-dimensional (2D) jet engine nozzle designs for future fighter aircraft. IPD techniques used will lower weapon system life-cycle costs through development of more producible, reliable and maintainable jet engine nozzle designs.

Accomplishment

Engineers from Pratt & Whitney, under contract with the Manufacturing Technology and the Propulsion Directorates, have developed and implemented IPD principles to design jet engine nozzles. Gaps in manufacturing process technologies were identified and IPD principles were used.

Background

The 2D nozzles used for directing jet engine exhaust show great promise for increasing the

performance of future aircraft. By becoming part of the aircraft control system, 2D nozzles divert the flow of exhaust in a concentrated manner to maneuver the aircraft, which reduces the surface area drag. Historically, design concepts for this type of development have focused on performance parameters without consideration for supportability and producibility, which has led to expensive engineering changes with high life-cycle costs. IPD principles consider all elements of the product's life-cycle, including quality, cost, schedule and user requirements. By examining where problems develop and using IPD tools and techniques, problem areas can be addressed and eliminated in the design phase where changes are less costly. Manufacturing and support issues are also addressed before critical technology decisions are made. Engineers from Pratt & Whitney of West Palm Beach FL, focused on IPD research concerning vectoring jet engine nozzles. To develop proper 2D nozzle IPD methodology, historical information was gathered to document lessons-learned, nozzle designs and problems. This data produced guidelines for future nozzle development which incorporated IPD techniques to avoid similar pitfalls. The information gathered also guided the definition of a mature technology data package to facilitate the transition of technologies from concept to product lines.